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National Space Science Data Center/  
World Data Center A For Rockets and Satellites

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(NASA-TM-67437) DOCUMENTATION FOR THE  
MACHINE-READABLE VERSION OF THE STELLAR  
SPECTROPHOTOMETRIC ATLAS,  $3130 \text{ \AA} < \lambda < 10800 \text{ \AA}$   
OF GUNN AND STRYKER (1983) (NASA)  
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DOCUMENTATION FOR THE MACHINE-READABLE VERSION  
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OF GUNN AND STRYKER (1983)

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March 1983  
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World Data Center A for Rockets and Satellites (WDC-A-R&S)  
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*STELLAR SPECTROPHOTOMETRIC ATLAS, 3130 Å < λ < 10800 Å*  
OF GUNN AND STRYKER (1983)

ABSTRACT

A detailed description of the machine-readable version of the Atlas as it is currently being distributed from the Astronomical Data Center is given. The data were obtained with the Oke multichannel scanner on the 5-meter Hale reflector for purposes of synthesizing galaxy spectra, and the digitized atlas contains normalized spectral energy distributions, computed colors, scan line and continuum indices for 175 selected stars covering the complete ranges of spectral type and luminosity class. The documentation includes a byte-by-byte format description, a table of the indigenous characteristics of the magnetic tape file, and a sample listing of logical records exactly as they are recorded on the tape.

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## SECTION 1 - INTRODUCTION AND SOURCE REFERENCE

The machine-readable version of the *Stellar Spectrophotometric Atlas*,  $3130 \text{ \AA} < \lambda < 10800 \text{ \AA}$  contains normalized spectral energy distributions for 175 selected stars. The data were obtained for purposes of synthesizing galaxy spectra, but may be generally useful for other applications (although the source reference should be consulted prior to using the data).

This document describes the machine version of the atlas as it is currently being distributed from the Astronomical Data Center. It is intended to enable users to read and process the data without problems or guesswork. For additional information concerning the observations, data reductions, accuracy and limitations, computation of the scanner colors, and for graphical representation of the scans, the user should refer to the source reference (Gunn and Stryker 1983). A copy of this document should accompany any machine-readable copy of the catalog.

### SOURCE REFERENCE

Gunn, J. E. and Stryker, L. L. 1983, *Astrophys. J. Suppl.* 52, 121.

## SECTION 2 - TAPE CONTENTS

The machine-readable *Stellar Spectrophotometric Atlas*,  $3130 \text{ \AA} < \lambda < 10800 \text{ \AA}$  file consists of groups of logical records for each star. There are 175 groups of 142 logical records each, with a group consisting of two header records followed by 140 data records. Since all record groups are identical in format, Table 1 contains byte-by-byte descriptions of the two header records only, followed by a general description of the data records. For more detailed information on the data in the header records, the source paper should be consulted.

Table 1. Tape Contents. *Stellar Spectrophotometric Atlas*.

Byte(s)	Units	Suggested Format	Description
<u>Record 1</u>			
1- 4	---	I4	Sequential number from 1 to 175.
5-64	---	15A4	or equivalent. Star identification, spectral type and other miscellaneous information entered or taken at the telescope: AV = visual absorption; AP = aperture size; G, R, B = green, red, and blue filters; plus codes for object and day of the observing run. The $A_V$ values given in bytes 73-80 should be used rather than the reference values given here.
65-72	mag	F8.3	V magnitude, as calculated in the scan reductions. Although these data are recorded to a precision of 0m001, they are accurate only to 0m1.
73-80	mag	F8.3	Visual absorption, $A_V$ , as calculated in the scan reductions. The thousandths column (always zero) is insignificant.
<u>Record 2</u>			
1- 7	mag	F7.3	U-B color as found from the scan (the scans were convolved with the standard filter functions to determine the colors).
8-14	mag	F7.3	B-V scan color.

Table 1 (concluded)

Byte(s)	Units	Suggested Format	Description
15-21	mag	F7.3	V-R scan color.
22-28	mag	F7.3	R-I scan color.
29-35	---	F7.3	An approximation to the airmass (the actual quantity is $\sec z$ ) at mid-observation.
36-56	---	3F7.3 (21X)	Internal data used for plotting purposes.
57-63	rad	F7.3	Right ascension (1950) taken from various sources.
64-70	rad	F7.3	Declination (1950) taken from various sources.
71-80	---	F10.3	The cosecant of the Galactic latitude $b$ .



### Records 3-142

The data records contain three arrays of data, as described below:

- Array 1: Flux (K), K = 1, 509, the normalized fluxes at 509 wavelengths. Elements 1-3, 507-509 always zero. Energy distribution data are given per unit frequency interval,  $\lambda^{-1}$ , at each wavelength.
- Array 2: Sigma (K), K = 1, 509, the flux error estimates at the 509 wavelengths. Elements 1-3, 507-509 always zero.
- Array 3: XBL (K), K = 1, 102, miscellaneous data. Element 1 contains an internal tape number, element 2 contains 777. if variable atmospheric cycles have been removed (see Gunn and Stryker 1983, section II); otherwise zero. Element 3 contains 888. if reddening problems were encountered (see Gunn and Stryker 1983); otherwise zero. Elements 4-10 are zero, while elements 11-28 contain the scan "continuum" colors: 33-37, 37-40, 40-46, 46-V, V-70, 70-87, 87-99 and the feature indices: *Balmer break*, *CN38+*, 41-42, *Ca H*, *Ca K*, *Ti61+*, *Ti71+*, *Ca42*, *CH43*, *Mg51* and *Na D*, respectively. Elements 29-102 are zero.

The elements of the three arrays are located in contiguous positions starting at the beginning of record 3. A sample FORTRAN statement to read a complete group of records for a star from unit 1 might be:

```
      READ (1,100) ID,(AL(K),K=1,15),V,VA,(BBCOL(K),K=1,4),  
        (STUFF(K),K=1,7),(F(K),K=1,509),(S(K),K=1,509),(XBL(K),K=1,102)  
100  FORMAT (I4,15A4,2F8.3 / 10F7.3,F10.3 / (8E10.3))
```

It is important to note and take into consideration the fact that the wavelength increment changes from the blue to the red; thus, in order to assign wavelength values to the fluxes and their errors, the following algorithm should be used:

```
      DIMENSION LAMBDA(509)  
      DO 1 I=1,262  
1  LAMBDA(I) = 3130 + 10 * (I-1)  
      DO 2 I=263,509  
2  LAMBDA(I) = 5740 + 20 * (I-262)
```

### SECTION 3 - TAPE CHARACTERISTICS

The information contained in Table 2 is sufficient for a user to describe the indigenous characteristics of the machine-readable *Stellar Spectrophotometric Atlas* to a computer. Information easily varied from installation to installation, such as block size (physical record length), blocking factor (number of logical records per physical record), total number of blocks, tape density, number of tracks, and internal coding (EBCDIC, ASCII, etc.) is not included, but should always accompany secondary copies if any are supplied to other users or installations.

Table 2. Tape Characteristics. *Stellar Spectrophotometric Atlas*.

NUMBER OF FILES .....	1
LOGICAL RECORD LENGTH (BYTES) .....	80
RECORD FORMAT .....	FB*
TOTAL NUMBER OF LOGICAL RECORDS .....	24850

\* Fixed block length (last block may be short)

#### SECTION 4 - REMARKS, ACKNOWLEDGMENT AND REFERENCE

The magnetic tape version of the *Stellar Spectrophotometric Atlas* was received from Dr. L. L. Stryker of the Dominion Astrophysical Observatory on 21 October 1982. A brief description of the format was supplied with the tape, the latter being written with 84-byte logical records having the digits "0084" in bytes 1-4 of each record. The atlas was transferred to disk storage and changed to 80-byte logical records by elimination of the "0084".

A computer program to print and plot spectra from the atlas is available and can be obtained from Dr. Stryker.

An error in the name identification for star number 115 has been found and transmitted by Dr. Stryker: HD 113439 should be HD 113493. The error has not been corrected in the machine-readable version.

#### ACKNOWLEDGMENT

Appreciation is expressed to Dr. Linda L. Stryker for supplying the original magnetic tape of the atlas, for sending a preprint of the published paper, and for replying quickly in response to questions about the format description. Dr. Stryker kindly reviewed the completed document.

#### REFERENCE

Gunn, J. E. and Stryker, L. L. 1983, *Astrophys. J. Suppl.* 52, 121.

## SECTION 5 - SAMPLE LISTING

The sample listing given on the following pages contains logical data records exactly as they are recorded on the tape. Groups of records from the beginning and end of the Atlas are illustrated. The beginning of each record and bytes within the record are indicated by the column heading index across the top of each page (digits read vertically).



